

**MOUNT CARMEL SCHOOL, ANAND NIKETAN**  
**PERIODIC TEST-1 (2023-24)**  
**CLASS XII**  
**CHEMISTRY (043)**

Time: 3hr

max marks: 70

General Instructions: Read the following instructions carefully.

- There are 35 questions in this question paper.
- SECTION A consists of 18 multiple-choice questions carrying 1 mark each.
- SECTION B consists of 7 very short answer questions carrying 2 marks each.
- SECTION C consists of 5 short answer questions carrying 3 marks each.
- SECTION D consists of 2 case-based questions.
- SECTION E consists of 3 long answer questions carrying 5 marks each.
- All questions are compulsory.

**SECTION A (18x1=18)**

The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

- A on reaction with NaOH gives  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COONa}$  and  $\text{C}_2\text{H}_5\text{OH}$ . Identify A 1
  - $\text{CH}_3\text{COOCH}_2\text{CH}_2\text{CH}_3$
  - $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
  - $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_3$  ✓
  - $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$

*Handwritten notes:  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_3 + \text{NaOH} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{COO}^- \text{Na}^+ + \text{C}_2\text{H}_5\text{OH}$*
- $\text{C}_6\text{H}_5\text{COOCOCH}_3$  on hydrolysis gives 1
  - $\text{CH}_3\text{COOH}$  and  $\text{C}_6\text{H}_5\text{OH}$
  - $\text{C}_6\text{H}_5\text{COOH}$  and  $\text{CH}_3\text{OH}$  ✓
  - $\text{C}_6\text{H}_5\text{COOH}$  and  $\text{CH}_3\text{COOH}$
  - $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$  and  $\text{CH}_3\text{COOH}$

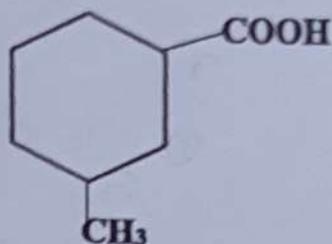
*Handwritten notes:  $\text{C}_6\text{H}_5\text{COOCOCH}_3 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{COOH} + \text{CH}_3\text{COOH}$*
- Cinnamaldehyde is 1
  - 2-Phenylprop-2-enal
  - prop-2-enal ✓
  - 3-Phenylprop-2-enal
  - 3-Phenylprop-2-enoic acid

*Handwritten notes:  $\text{CH}_2=\text{CH}-\text{CHO}$  (prop-2-enal)*
- Benzene on treatment with carbon monoxide and hydrogen chloride in the presence of anhyd.  $\text{AlCl}_3$  gives benzaldehyde This is 1
  - Stephen's reaction
  - Etard reaction ✓
  - Hell Volhard Zelinsky reaction
  - Gatterman Koch reaction
- Acetal is 1
  - Alkoxyalcohol
  - $\beta$ -Hydroxyaldehyde
  - $\alpha$ -Halocarboxylic acid
  - gem-dialkoxy compound ✓

*Handwritten notes:  $\text{R}-\text{C}(\text{OR})_2-\text{H}$*
- $\text{HCHO} + \text{HCHO} + \text{conc. NaOH} \xrightarrow{\Delta} \text{HCOONa} + \text{CH}_3\text{OH}$  1  
 This reaction is called
  - Aldol condensation
  - Clemmensen reduction
  - Wolff Kishner reduction
  - Cannizzaro reaction ✓

1. Write the IUPAC name of the compound

1



- (a) 3-Methyl cyclohexanoic acid
- (b) 3-Methyl cycloheptanoic acid
- (c) 3-Methyl cyclohexane carboxylic acid
- (d) 5-Methyl cyclohexane carboxylic acid

8. In which of the following reactions hydrogen gas is released

1

- (a)  $\text{CH}_3\text{COOH} + \text{NaHCO}_3$
- (b)  $\text{CH}_3\text{COOH} + \text{NaOH}$
- (c)  $\text{CH}_3\text{COOH} + \text{Na}$
- (d)  $\text{CH}_3\text{CH}_2\text{OH} + \text{NaOH}$



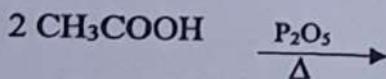
9. Identify the strongest acid

1

- (a) Ethanoic acid
- (b) Benzoic acid
- (c) 4-Methoxybenzoic acid
- (d) 4-Nitrobenzoic acid

10. Identify the product of the following reaction

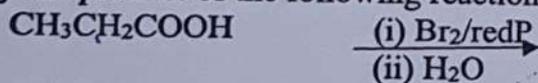
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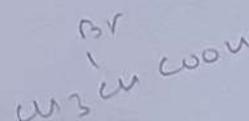
- (a)  $\text{CH}_4$
- (b)  $(\text{CH}_3\text{CO})_2\text{O}$
- (c)  $\text{CH}_3\text{COOCH}_2\text{CH}_3$
- (d)  $(\text{HCO})_2\text{O}$

11. Identify the product of the following reaction

1



- (a)  $\text{CH}_3\text{CH}_2\text{COBr}$
- (b)  $\text{CH}_3\text{CHBrCOOH}$
- (c)  $\text{CH}_2\text{BrCH}_2\text{COOH}$
- (d)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$



12. Select the compound which is most reactive towards nucleophilic addition reaction.

1

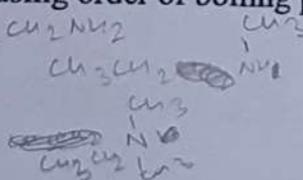
- (a) Ethanal
- (b) Propanal
- (c) Propanone
- (d) Butanone

13. Arrange the following in the increasing order of boiling point

1

- A - propan-1-amine
- B - N-Methylethanamine
- C - N,N-Dimethylmethanamine

- (a)  $A < B < C$
- (b)  $B < C < A$
- (c)  $C < A < B$



(d)  $C < B < A$

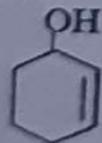
Questions 14 to 18 are questions based on **assertion and reasoning type**.

- a. Both assertion and reason are correct statements and reason is the correct explanation of the assertion.
- b. Both assertion and reason are correct statements and reason is not the correct explanation of the assertion
- c. Assertion is correct, but reason is wrong.
- d. Assertion is wrong but reason is correct.
14. Assertion: Propanal is less susceptible towards nucleophilic addition as compared to benzaldehyde. 1  
Reason: Carbonyl carbon in propanal is more electrophilic as compared to carbonyl carbon in benzaldehyde d
15. Assertion: Benzaldehyde on reaction with conc.  $\text{HNO}_3$  and conc.  $\text{H}_2\text{SO}_4$  gives meta Nitrobenzaldehyde 1  
Reason: Carbonyl group acts as a deactivating and meta directing group. a
16. Assertion: Aryl halides are extremely less reactive towards nucleophilic substitution. 1  
Reason: In haloarenes halogen is attached to carbon atom which is  $\text{sp}^3$  hybridised. d
17. Assertion: Ortho and para nitrophenol can be separated by steam distillation. 1  
Reason: Ortho nitrophenol is steam volatile due to intermolecular hydrogen bonding. c
18. Assertion: Ethanoic acid is soluble in water but benzoic acid is nearly insoluble in water. Reason: Higher carboxylic acids are insoluble in water due to increased hydrophobic interactions of hydrocarbon part. a

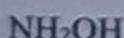
**SECTION-B**

(7x2=14)

19. Write the formula of reagents used in the following reactions: 2  
(a) Bromination of phenol to 2,4,6-Tribromophenol  $\text{Br}_2, \text{NaOH}$   
(b) Hydroboration of propene and oxidation to propan-1-ol.  $(\text{BH}_3)_2, \text{H}_2\text{O}_2/\text{OH}^-$
20. Arrange the following compounds in the Increasing order of their property mentioned  
(a) p-nitrophenol, ethanol, phenol (acidic character)  
(b) propanol, propane, n-propyl chloride (boiling point)
21. Give simple chemical tests to distinguish between the following pairs of compounds 2  
(a) ethanol and phenol Ferric  
(b) propan-1-ol and 2-methylpropan-2-ol
22. (a) Draw the structural formula of cinnamaldehyde  $\text{CH}_2=\text{CH}-\text{CHO}$  2  
(b) Give the IUPAC name of the following compound  
$$\text{CH}_2=\underset{\text{CH}_3}{\text{C}}-\text{CH}_2\text{COCH}_2\text{CHO}$$
23. Although chlorine is an electron withdrawing group, yet it is ortho-, para directing in electrophilic aromatic substitution reaction. Explain with the help of resonating structures. 2
24. An organic compound 'A' having molecular formula  $\text{C}_5\text{H}_{10}\text{O}$  gives negative Tollens' test, forms n-pentane on Clemmensen reduction but doesn't give iodoform test. 2  
Identify 'A' and give all the reactions involved.
25. Write the product of the following reaction 2



A



B



[3]

SECTION C

(5x3=15)

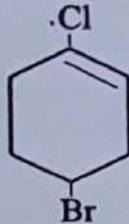
26. Give reasons

- (a) C-OH bond length in phenol is shorter than O-H bond length in CH<sub>3</sub>OH
- (b) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.
- (c) S<sub>N</sub>2 reactions are accompanied by inversion in optically active alkyl halides

27. Write the reactions involved in the following:

- (a) Etard reaction *up: 11*
- (b) Fittig reaction
- (c) Kolbe's reaction *NaOH, CO<sub>2</sub>, h<sup>+</sup>*

28. (a) Write the IUPAC name of the following compound



- (b) Identify the product formed when propan-1-ol is treated with conc. H<sub>2</sub>SO<sub>4</sub> at 413K.
- (c) How will you convert propene to n-propyl iodide

29. Compound A C<sub>3</sub>H<sub>7</sub>Cl reacts with KCN to give B which on partial hydrolysis gives C. B on complete hydrolysis gives butanoic acid. C on reaction with NaOH/Br<sub>2</sub> gives D which on reaction with nitrous acid gives E. E on reaction with SOCl<sub>2</sub> gives A. Identify A to E and also write the equations involved

30. Write the main product formed when propanal reacts with the following reagents :

- (i) 2 moles of CH<sub>3</sub>OH in presence of dry HCl
- (ii) Dilute NaOH
- (iii) H<sub>2</sub>N - NH<sub>2</sub> followed by heating with KOH in ethylene glycol

SECTION-D

(4x2=8)

31. Iodoform or Haloform tests are usually performed to detect the presence of Aldehydes and Ketones that contain an Alpha methyl group. It is also helpful to differentiate Ethanol from Methanol. The test can be performed either by using Iodine with aqueous Sodium Hydroxide (NaOH) solution or by using Potassium Iodide (KI) with Sodium Hypochlorite solution (NaClO). Carbonyl compounds with R-CO-CH<sub>3</sub> structure and Alcohols with R-CH(OH)CH<sub>3</sub> structure readily undergo iodoform test. Some secondary alcohols that consist of at least one methyl group in the alpha position also undergo the test.

1. Iodoform can be prepared from all except

- (a) isopropyl alcohol
- (b) 3-methyl-2-butanone
- (c) isobutyl alcohol
- (d) ethyl methyl ketone

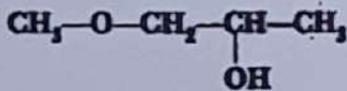
2. Write the products of reaction of NaOH/Br<sub>2</sub> with acetophenone.

3. What is the IUPAC name of iodoform.

4. Write a chemical test to distinguish between pentan-2-one and pentan-3-one.

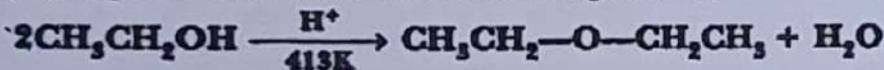
32. Ether are a class of organic compounds characterized by an oxygen atom bonded to two alkyl or aryl groups. Ethers are similar in structure to alcohols, and both ethers and alcohols are similar in structure to water. In an alcohol one hydrogen atom of a water molecule is replaced by an alkyl group, whereas in an ether both hydrogen atoms are replaced by alkyl or aryl groups. The most versatile method for making ethers is the Williamson ether synthesis. It uses an alkoxide ion to attack an alkyl halide, substituting the alkoxy ( $-\text{O}-\text{R}$ ) group for the halide. The alkyl halide must be unhindered (usually primary), or elimination will compete with the desired substitution. Ethers are good solvents partly because they are not very reactive. Most ethers can be cleaved, however, by hydrobromic acid ( $\text{HBr}$ ) to give alkyl bromides or by hydroiodic acid ( $\text{HI}$ ) to give alkyl iodides.

(i). Write the IUPAC name of the given compound:



(ii).  $(\text{CH}_3)_3\text{C}-\text{O}-\text{CH}_3$  on reaction with  $\text{HI}$  gives  $\text{CH}_3\text{OH}$  and  $(\text{CH}_3)_3\text{C}-\text{I}$  as the main products and not  $(\text{CH}_3)_3\text{C}-\text{OH}$  and  $\text{CH}_3\text{I}$ . Justify

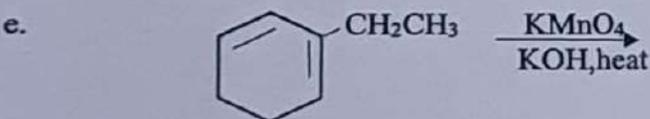
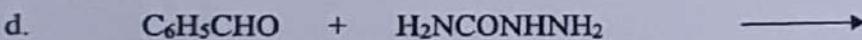
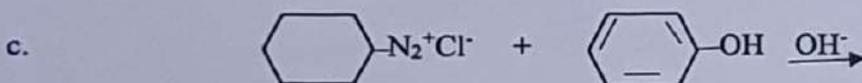
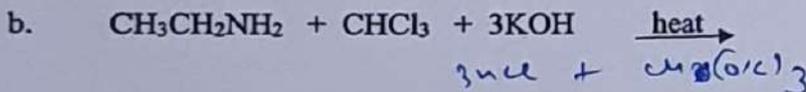
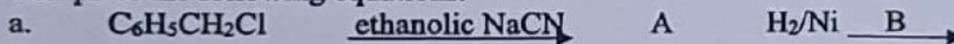
(iii). Explain the mechanism of the following reaction:



### SECTION-E

33. Complete the following equations.

(3x5=15)



34. (a) Arrange the following compounds in increasing order of their property as indicated: 2

(i)  $\text{C}_6\text{H}_5\text{OH}$ ,  $\text{FCH}_2\text{COOH}$ ,  $\text{ClCH}_2\text{COOH}$ ,  $\text{CH}_3\text{COOH}$  - acid character

(ii) Propanal, Acetaldehyde, Benzaldehyde, Acetophenone - reactivity towards addition of  $\text{HCN}$

(b) Why is alpha ( $\alpha$ ) hydrogen of carbonyl compounds acidic in nature? 1

(c) Arrange the following in the increasing order of basic strength 1

$\text{N,N}$ -Diethylethanamine,  $\text{N}$ -Ethylethanamine, Ethanamine, Benzenamine

[5]

Benzaldehyde < Acetophenone < Acetaldehyde < Propanal

(d) Arrange the following in decreasing order of  $pK_b$  value 1  
 $C_6H_5NH_2$ ,  $C_6H_5N(CH_3)_2$ ,  $(C_2H_5)_2NH$ ,  $CH_3NH_2$

35. (i) Draw the structure and write the IUPAC name of the following compounds 2

a. acrolein

b. m-Bromobenzaldehyde

(ii) Give reasons 2

a. Aniline does not undergo Friedel Craft's alkylation and acylation

b. Aryldiazonium is stable but alkyl diazonium is not.

(iii) What happens when Propanone is treated with methyl magnesium iodide and then hydrolysed. 1

